NIGERIAN AGRICULTURAL JOURNAL
ISSN: 0300-368X
Volume 49 Number 2, October 2018. Pp. 136-142
Available online at: http://www.ajol.info/index.php/naj

DETERMINANTS OF COMMERCIALIZATION AND FOOD SECURITY OF CASSAVA PRODUCING HOUSEHOLDS IN ABIA STATE, NIGERIA

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ABSTRACT
The study examined the determinants of commercialization and food security of cassava producing households in Abia state, Nigeria. It specially analyzed the factors that influenced the commercialization of cassava and food security of households. The study employed multistage sampling technique in the selection of one hundred and twenty households from whom data and information were elicited using pre-tested and structured questionnaire. In data analysis, multiple regression model, probit model and food security indices were used. Analysis of the factors that influenced commercialization of cassava producing household using Cobb Douglas function of the multiple regression model, revealed that the coefficients of farm size, household size, age, output, off - farm incomes, planting materials and access to credit were statistically significant at varied levels. The coefficient of multiple determination R^2 was 0.759. The determinants of food security using the probit model depicted that household size, off-farm income, output, access to consumption credit, remittances and farm size were statistically significant at varied levels. The pseudo R^2 gave a value of 0.730. The study recommended that the land use act should be reviewed and made more operational to serve the interest and ambition of farmers who would want to engage in commercial cassava production or a related venture at least to increase employment in the sub-sector.

Keywords: Determinants, Agricultural Commercialization, Cassava, and Food Security

Introduction

Cassava has been identified as one of the important staples of rural and urban households in southern Nigeria (Nweke, Haggblade and Zulu, 2004). According to the Ministry of Health and Nutrition in Nigeria (2004), it was discovered that daily consumption of cassava per capita at the national level was 226.93g. In the rural areas, the daily per capita consumption was 239.74g, while in urban areas, it was 213.76g per person per day. Surprisingly, urban and rural consumptions were not dissimilar, confirming the fact that cassava is truly a national food with urban market presence. (Ministry of Health and Nutrition Nigeria, 2004; Phillips, Taylor, Sanni and Akoroda, 2004). This high rate of consumption therefore demand production in commercial quantities. Goverah, Jayne and Ngoro (1999) defined agricultural commercialization as the proportion of agricultural production that is marketed. According to them, agricultural commercialization aims to bring about a shift from production for solely domestic consumption to production dominantly market-oriented.

Commercial transformation of subsistence agriculture is an indispensable pathway towards economic growth and development for many agriculture dependent development countries (World Bank, 2008; Nwachukwu, Ezeh and Nwachukwu, 2014). Sustainable household food security and welfare also require commercial transformation of subsistence agriculture. This is likely to result in welfare gains through the realization of comparative advantages, economies of scales and from dynamic technological organizational institutional change effects that arise from the flow of ideas due to exchange based interactions. This enhances the links between the input and output side of agricultural markets (Gebremedhin and Moti, 2010; Nwachukuwu *et al.*, 2014). Increasing per capital food production and raising agricultural incomes are arguably the greatest challenges facing sub-Saharan Africa and the developing world generally. The history of economic

development in other regions of the world indicates that agricultural productivity growth has been the major source of sustained improvements in rural welfare (Strasberg, Jayne, Yamano, Nyoro, Karanja and Strauss, 1999). The argument that productivity growth and food security in small holder agriculture will require a more commercialized orientation implies that policy must be designed to encourage a transformation out of semi-subsistence, low input, low productivity agriculture that characterizes much of rural Nigeria.

Due to the usual thought of commercialization as large scale, economists usually tend to ignore the fact that even the small farmers and poor households participate in the market either because they produce a little surplus or sell to earn cash income to meet other family necessities. Further clarification of commercialization can be observed in the desperation among some of the poor households who sell their crops even before it is being harvested (distress sales). This is particularly the case when food is being sold and then the households are forced to buy back the same (or indeed a greater) quantity of food later in the year when the price is much higher (Borbala, 2004). However, despite the increased participation of small holders in commercialization of subsistence agriculture, over 800 million people particularly in developing countries still do not have enough food to meet their basic national needs. Inadequacy of household and national incomes to purchase food, unstable demand and supply, man made and natural disasters have contributed to inaccessibility of food. This has created a gap in nutrition that has left the individual, state or nation insecure. (Omotesho, Adewumi, Muhammad, Lawal and Ayinde, 2006).

In other to bridge this widening gap in nutrition and its attendant food security in Nigeria, government has tried several agricultural programmes and projects. Some of these programmes and projects are still ongoing, while others have since phased out (Nwachukwu and Ezeh, 2007). The intervention in root and tuber crops particularly in cassava in the form of presidential initiative and strategic plan for the development of the cassava industry in 2003 and 2006 respectively is significant in the fight against food security. This is because Nigeria has comparative advantage in the production of cassava and has remained its leading global partner since 2006 (Cassava Master Plan, 2006; Sanni, Onadipe, Ilona, Mussagy, Abass and Dixon, 2009).

Cassava today, ranking as a major staple food particularly among low income earners and poor farmers in developing countries of Sub-Saharan Africa serves over 200 million people. There is therefore need to encourage its cultivation (FAO 2000; Nweke *et al.*, 2008). This however shows that commercialization of small holder farming is not yet high enough for farmers to gain from increased income and the farmers are not yet out from subsistence-oriented agriculture (Mahalet, 2007). Small holder farmers have been hindered from exploiting the welfare outcomes of commercialization as a result of high transaction costs and market imperfections. Thus, unless these hurdles are removed and better environment created, it is not possible for small holder farmers to integrate with the market and enjoy the benefits of commercialization. (Bernard, Eleni and Alamayehu, 2007).

Presently, 75 percent of the poor people in developing countries live in rural areas. So, strengthening the agricultural sector not only means improving access to nutritious food, but also the necessity of creating a sustainable environment for enhancing food security and economic development. The majority of small farmers experience difficulties in food production with post harvest losses, also small holder farmers suffer from weak connections to national and international markets and fail to add value to their agricultural products. All these factors affect their incomes negatively causing food insecurity for their families.

Methodology

The study was conducted in Abia State located within the southeastern Nigeria. It lies between longitudes 04^0 45' and 06^0 07'E and latitude 07^0 00' and 08^0 10'N. Households employed for the study were selected using multistage random sampling technique. In the first stage, two Local Government Areas were selected randomly from each of the three agricultural zones of the state. The second stage involved random selection of two communities from each of the Local Government Areas. Then the final stage involved selection of 10 cassava producing households from each of the selected communities in each of the LGAs. This gave a sample size of 120. The survey instrument was well structured and pre-tested questionnaire administered to elicit data and information from the selected households. Data were analyzed using commercialization index for specific objective I, regression model for specific objective II, probit model and food security index. The models were specified as follows"

$$\text{Commercialization index} = \frac{\text{value of crop sold}}{\text{Total value of crop produced}} \times \frac{100}{1} \quad (1)$$

This is in line with Govereh *et al.,* (1999) and Strasberg *et al.,* (1999) who employed the index

Multiple regressions: This is explicitly presented as;

$$\text{Log } Y = bo+b_1x1+b_2 \log X_2+ b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + b_7 \log X_7+ b_8 \log X_8 + b_9 \log X_9 + b_{10} \log X_{10}+e \quad (2)$$

Where:
Y = Index of commercialization
X_1 = Farm size (hectares)
X_2 = Household size (N_0)
X_3 = Fertilizer (kg)
X_4 = Education (years)
X_5 = Age (years)
X_6 = Output (kg)
X_7 = Off farm income (Naira)
X_8 = Planting Material (kg)
X_9 = Access to credit (Naira)
X_{10} = Labour inputs (Mandays)
ei = Error term

The Cobb Douglas function was employed in line with Okezie *et al.,* (2012) who employed the same in their study.

Food security index is expressed as;

$$\frac{\text{Fi = per capita food expenditure for the ith household}}{{}^{2}/_{3} \text{ mean per capita food expenditure of all households}} \quad (3)$$

Where,
Fi = Food security index
Fi > 1 = Food secure i^{th} household
Fi < Food insecure i^{th} household
A food secure household is therefore that whose per capita monthly food expenditure falls above or is equal to two-third of the mean per capita food expenditure. On the other hand, a food insecure household is that whose per capita food expenditure falls below two thirds of the mean monthly per capita food expenditure. (Omonona and Agoi, 2007; Arena and Anyaji, 2010).
The probit model for the estimation of determinants of food security is specified thus;

$$P(Y = 1/x) = F(XB) = 1/\sqrt{2\pi} \int_{-\infty}^{XB} e - \frac{(XB)^2}{2} dx \quad (4)$$

Where,
$X = (1, X_1i, X_{2i} \ldots X_ki$
$B' = (\beta_0, \beta_{1,} \ldots \beta_k)$
Y = Vector of dependent variable (1 for food secure households; O for food insecure households
X = Vector of explanatory variables (predicators)
$\propto$ = probit coefficients
e_i = random error term

The explanatory variables included in the model are:
X_1 = Sex (Dummy: male – 1; female – 0)
X_2 = Education of Head of household (years)
X_3= Household size (Number)
X_4 = Age (years)
X_5 = monthly income (Naira)
X_6 = Output of cassava (kg)
X_7 = membership of cooperative (yes – 1; No-0)
X_8 = Access to consumption credit (Naira)
X_9 = Remittances from outside the community (Naira)
X_{10} = Farm size (hectare)

Results and Discussion

Analysis of the current level of commercialization

The analysis of the current level of commercialization among the cassava producing households using the commercialization index is shown in Table 1. It showed that a typical household that produced cassava sold on the average of 50 percent of its output with total sales ranging from 5.60% to 90.00%.

This implies that the most commercialized cassava producing household sold 90.00% of the gross value of its total cassava production. This can be compared to the national average of 33-36% in Ethiopia (Samuel and Sharp, 2007). However, this level of commercialization can be said to be low given the fact that Nigeria remains the largest producer of cassava and Abia State belongs to South East Zone that contributes about 20% to the national basket. (Cassava Master plan 2006; Nwachukwu *et al.,* 2014).

Analysis of factors that influence commercialization of cassava

In the bid to analyze factors that influence commercialization of cassava in the study area, the Cobb Douglas function of the multiple regression model was estimated and the result presented in Table 2. Among the variables tested, the coefficients of farm size, household size, age, output, off-farm income, planting materials and access to credit were statistically significant at varied probability level. More specifically, the coefficient of farm size (0.027) is positive and significant at one percent probability level.

The implication is that large firms enhance the propensities to produce surplus for the market (Martey *et al.,* 2012). The result confirms the findings Olwande and Mathenge (2010) that households with larger farm sizes are able to produce marketable surpluses. The coefficients of household size (-0.150) and age (-0.112) possessed negative signs and are statistically significant at 10.0% and 5.0% probability levels respectively. This indicates that both household

size and age have inverse relationship with commercialization of cassava. The implication is that young, active and energetic members of the households contribute more to commercialization of cassava. However, large households limit commercialization and exacerbate consumption propensities. This is because much of what is produced would be consumed. This result contradicts the findings of Enete and Igbokwe (2009) that older households are more likely to increase the extent of cassava sales. However, the negative sign posted by household coefficient is plausible since the increasing households will consume the bulk of what they assisted in producing. This reduces the marketable surplus and by extension, limits commercialization. Although output and off- farm income are sparingly significant, they posses positive signs. From the result one percent increase in cassava sales resulted from 14.8% increase in output and 6.20% increase in farm income. Household incomes both farm and non-farm have the potentials of reducing dependency on the agricultural output and thus commercialization (Agwu *et al.,* 2012).

Contrary to *a priori* expectation, the coefficient of planting materials (-0.433) and access to credit (-0.188) had negative signs and significant at one percent probability levels. However, the result is considered plausible when there is absence of resource use efficiency. This is contrary to Randela *et al.,* (2008) who found a positive relationship between access to credit and commercialization. Given that the Cobb Douglas function was selected as the lead equation, the coefficients can be interpreted as direct elasticities (Felipe, 1998). As such, the magnitude of the coefficients is a reflection of the quantum of contribution of the variable to the regressand. Therefore, it could be deduced that output played a dominant role because it contributed more than any other factor to commercialization of the commodity. In the diagnostic statistics, the F-ratio of 5.326 is statistically significant at one percent probability level confirms the overall significance of the model and its high explanatory power. The coefficient of multiple determination $R^2$of 0.759 implies that the predictors were able to explain the variability in commercialization of cassava by 75.9% while error and omitted variables accounted for 24.1%

Determination of Factors Affecting Food Security in Abia State Nigeria

In addressing determinants of food security among the cassava producing households, a probit model was estimated and the result presented in Table 3. Among the variables tested; household size, off- farm income, output, access to consumption credit, remittances and farm size were statistically significant at given probability levels. The coefficient of household size (-1.146) possessed the expected negative sign implying that increasing household size enhanced the chances of reducing food security status of the cassava producing households. This finding consolidates the outcome of Omotesho *et al.,* (2006) who obtained a negative sign for household size in a similar study in Kwara State.

In line with *a priori* expectation, both coefficients of off-farm incomes (9.072) and access to consumption credit (1.234) have positive effect on food security status of the households. The implication is that households with higher off farm incomes and access to consumption credit have higher probability of being food secure because the more gainfully employed a person is, the greater the chances of being food secure (Arene and Anyaeji, 2010). In reality, access to consumption credit plays a complementary role to income especially when there is economic shock or crunch.

Similarly, the coefficients of output (0.100) and remittances (8.690) and farm size (0.548) posted positive coefficients. Given the magnitude of the coefficients, it could be observed that one percent rise in food security status of the households is realized by increase in output, remittances and farm size to the tune of 1.0%, 8.7% and 0.5% respectively. Olayemi (1998) and Oluyole *et al.,* (2009) opined that increase in output is likely to be synonymous with the availability of more food. However, it is important to note that increased farm size guarantees large output while remittances are more like additional income. As such, it is anticipated to exert the similar effect as income. The result further showed that overall probit model is significantly different from zero at one percent probability level based on the chi-square value (121.11), thus implying that the explanatory variables are relevant in determining household food security status.

Conclusion

Having examined the determinants of commercialization and food security of cassava producing households in Abia State, there is need to re-orientate farmers in order to achieve self sufficiency as a nation. As shown by the results, the significant determinants of commercialization were found to be farm size, household size, age, output, off-farm income, planting materials and access to consumption credit. Also, household size, off-farm income, output, access to consumption credit, remittances and farm size were found to be significant determinates of food security. It is obvious that increased output is an integral part of commercialization. Incentives have to be used to

attract people especially young entrepreneurs to the promotion of commercial cassava production. World Bank assisted programmes such as CAD (Commercial Agriculture Development) should be encouraged. This will make diversification of the economy a tangible reality. It is therefore necessary to formulate new agricultural policies (input subsidy, market access policy) to promote commercialization of cassava over which Nigeria has huge comparative advantage and assist producing households and communities in attaining food security.

References

Agwu, N.M. Anyanwu, C.I. and Mendie, E.I. (2012). Socio-economic Determinants of Commercialization among Small Holder Farmers in Abia State Nigeria. G*reener Journal of Agricultural Sciences*, 2(8):392-397

Arene, C.J. and Anyaeji, B.C. (2010). Determinants of Food security among Households in Nsukka Metropolis of Enugu, Nigeria. *Pakistan Journal of Social Sciences*, 30(1):9-16

Bamidele, F.S., Babatunde, R.O. and Rasheed, A. (2008). Productivity Analysis of Cassava-Based Production Systems in the Guinea Savannah: Case Study of Kwara State, Nigeria. *American-Eurasian Journal of Scientific Research*, 3(1):33-39

Bernard, T., Eleni, G. and Alemayehu, S.T., (2007). Smallholders Commercialization Through Cooperatives. A Diagnostic for Ethiopia, IFRI Discussion paper No 00722

Borbala, B. (2004). Determinants of Commercialization of Individual Farms in Romania, Conference of International Agricultural Research for Development, Deutscher Tropentag Berlin, October 5-7

Cassava Master Plan (2006). A strategic Action plan for the Development of the Nigerian Cassava, Industry, Prepared by The United Nations Industrial Development Organization in Cooperation with the Ministry of Trade and Industry and the Presidential Initiative on Cassava.

Chirwa, E.W. and Matita, M. (2012). From Subsistence To Small Holder Commercial Farming in Malawi; Case of NASFAM Commercialization Initiatives, Future Agricultures Working Paper, 037.

Enete, A.A. and Igbokwe, E.M. (2009). Cassava Market Participation Decision of Households in Africa, *Tropicultura*, 27(3):129-136.

FAO, (2000). The State of Food and Agriculture, Food and Agriculture Organization of the United Stations, Rome, Italy.

FAO (2013). Food Security through Commercialization of Agriculture (FSCA) Strategy FAO/Italy Cooperative Programme. Publication of Food and Agricultural Organization of the United Nations.

Felipe, J. (1998). On the Interpretation of Coefficients of Multiplicative-Logarithnic Functions. A Reconsideration, *Applied Economics Letter*, (5):397-400.

Gebremedhin, B. and Moti, J. (2010). Commercialization of Smallholders: Is Market Participation Enough? Contributed Paper Presented at the Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Association of South Africa (AEASA) Conference Cape town, South Africa, September 19-23.

Govereh, J. Jayne, T.S. and Nyoro, J. (1999). *Smallholder Commercialization Interlinked Markets and Food Productivity: Cross Country Evidence in Eastern and Southern Africa,* the Department of Agricultural Economics and Department of Economics, Michigan State University, June 1999. Available on www.aec.msu.edu/fs2/ag-transformation/atwagover.PDF, (Assessed on 20.09.12).

Jaleta, M., Gebremedhin, B. and Hoekstra, D. (2009). *Smallholder Commercialization: Processes, Determinants and Impacts.* Discussion paper No 18. Improving Productivity and Market Success (IPMS) of Ethiopian Farmers Project, LKRI, Nairobi, Kenya. 55 Pp.

Mahelet, G.F. (2007). Factors Affecting Commercialization of Smallholder Farmers in Ethiopia: The case of North Omo Zone, SNNP Region. Paper Presented at the Fifth International Conference on the Ethiopia Economy.

Martey, E., Al-Hassan, R.M. and Kuwornu, J.K.M. (2012). Commercialization of Smallholder Agriculture in Ghana. A Tobit Regression Analysis. *African Journal of Agricultural Research*, 7(4):2131-2141.

Ministry of Health and Nutrition, Nigeria (2004). National Consumption Survey.

Nwachukwu, C.N., Ezeh, C.I. and Nwachukwu, I.N. (2014). Influence of commercialization on Food security status of Cassava Producing Households in Abia State, Nigeria. *Scientific Paper Series Management Economic Engineering in Agriculture and Rural Development* 14(3):195-199.

Nwachukwu, I.N. and Ezeh, C. I. (2007). Impact of Selected Rural Development Programmes on Poverty Alleviation in Ikwuano LGA of Abia State Nigeria. *African Journal of Food, Agriculture, Nutrition and Development.* 7(5):1-17.

Nweke, F., Haggblade, S. and Zulu, B. (2004). Building on Successes in African Agriculture: Recent Growth in African Cassava. *International Food Policy Research Institute, www.Ifpm.org.*

Okezie, C.A., Sulaimen, J. and Nwosu, A.C. (2012) Farm-Level Determinents of Agricultural Commercialization, *International Journal of Agriculture and Forestry* 2(2):1-5

Olayemi, J.K. (1998). Food Security in Nigeria, Research Report No 2, Development Policy Centre, Ibadan, Nigeria

Oluyole, K.A., Oni, O.A. Omonona, B.T. and Adenegan, K.O. (2009). Food security among Cocoa Farming Households of Ondo State, Nigeria, *Asian Research Publishing Network (ARPN) Journal of Agricultural and Biological Science* 4(5):7-13

Olwande, J. and Mathenge, M. (2010). Market Participation among the Poor Rural Households in Kenya. Tegemo Institute of Agricultural Policy and Development.

Omonona, B.T., and Agoi, G.A. (2007). An Analysis of Food Security Situation Among Nigerian Urban Households: Evidence from Lagos State, Nigeria, *Journal of Central European Agriculture,* 8(3):397-406

Omotesho, O.A., Adewumi, M.O., Muhammad-Lawal, A. and Ayinde, O. (2006). Determinants of Food Security Among the Rural Farming Households in Kwara State, Nigeria, *African Journal of General Agriculture,* 21(1):7-15,

Otieno, D.J., Omiti, J., Nyanamba, T. and McCullough (2009). Market Participation by Vegetable Farmers in Kenya: A Comparison of Rural and Peri-Urban Areas. *African Journal of Agricultural Research*, 4(5):451-460

Philips, T.P., Taylor, D.S., Sanni, L., and Akoroda, M.O. (2004). The Global Cassava Development Strategy. A Cassava Industrial Revolution in Nigeria. The Potential for A New Industrial Crop. IFAD (International Fund for Agriculture Development) Food and Agricultural Organization of the United Nation Rome, 2004.

Randela, R., Alemu, Z.C. and Groenewald, J. (2008). Factors Enhancing Market Participation by Small-Scale Cotton Farmers, *Agrekon*, 47(4):451-469

Samuel, G. and Sharp, K. (2007). Commercialization of Smallholder Agriculture in Selected Tef-Growing Areas of Ethiopia, *Ethiopian Journal of Economics* Volume XVI, Pp 99. Available on http://www.ajol.info/reviewissue.php, [Accessed on15.10.12]

Sanni, L.O., Onadipe, O.O., Ilona, P., Mussagy, M.D., Abass, A. and Dixon, A.G.O. (2009). Successes and Challenges of Cassava Enterprises in West Africa: A case study of Nigeria, Benin, and Sierra Leone: International Institute of Tropical Agriculture *(*IITA) Ibadan.

Strasberg, P.J., Jayne, T.S., Yamano, T., Nyoro, J. Karanja, D. and Strauss, J. (1999). A Summary of Report in Titllated: Effect of Agricultural Commercialization on Food crop input use and productivity in Kenya, Policy Synthesis (41) Mus Agricultural Economics.

World Bank (2008). World Development Report 2008: Agriculture for Development. Washington D.C.

Table 1: Current level of Commercialization among households

Degree of commercialization	**Frequency**
Low (1-25% of output sold)	8
Medium (26-50% of output sold	70
High (51-100%) of output sold	42
Mean commercialization index	51.48
Minimum commercialization Index (%)	5.60
Maximum commercialization Index (%)	90.00

Source: Field survey, 2018

Table 2: Determinants of Commercialization of Cassava in Abia state, Nigeria

Variables	Coefficients	Standard Error	t-Value
Constant	5.168**	1.478	3.497
Farm size	0.027***	0.007	3.858
Household size	-0.150*	0.076	-1.984
Fertilizer	0.065	0.119	0.582
Education	0.103	0.184	0.557
Age	-0.112**	0.041	-2.732
Output	0.148*	0.069	2.149
Off farm income	0.062*	0.032	1.938
Planting materials	-0.433***	0.089	-4.865
Access to credit	-0.188***	0.026	-7.230
Labour inputs	0.061	0.073	0.838
R^2	0.759		
F-ratio	5.326***		

Source: *Field survey, 2018*

***, ** and * represent significance at 1.0%, 5.0% and 10.0 % probability levels respectively.

Table 3: Estimate of factors influencing food security among the Households in Abia State

Variables	Coefficient	Standard Error	Z-statistic
Constant	4.279*	2.018	2.12
Sex	0.587	0.669	0.88
Education	-0.038	0.078	-0.49
Household size	-1.146***	0.231	-4.96
Age	0.020	0.031	0.67
Off farm income	9.072*	3.910	2.32
Output	0.100***	0.020	4.99
Membership of coop	1.043	0.769	1.36
Access to con credit	1.314*	0.700	1.96
Remittances	8.690***	2.450	3.55
Farm size	0.548***	0.109	5.00
Pseudo R^2	0.730		
LR chi-square	121.11***		

Source: Field Survey, 2018